

Docket No.: 509/3  
**EXPEDITED PROCEDURE**  
**PETITION TO MAKE SPECIAL**

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B.D.  
2/17/04

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Application of:  
Coats et al.

Application No.: 09/727,903

Group Art Unit: 2644

Filed: December 1, 2000

Examiner: Laura Grier

For: SUB-HARMONIC GENERATOR AND  
STEREO EXPANSION PROCESSOR

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FEB 17 2004

Technology Center 2600

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

**PETITION TO MAKE SPECIAL**  
**PURSUANT TO 37 C.F.R. §1.102 AND M.P.E.P. §708.02 VIII**

Dear Sir:

Pursuant to the provisions of 37 C.F.R. §1.102(d) and M.P.E.P. §708.02 III, Applicants hereby petition the Commissioner to designate the instant application special and to expedite prosecution of the application.

The instant application has not yet been examined.

Applicants submit that the claims of the instant application are directed to a single invention. If the Examiner properly determines that the claims are not directed to a single invention, Applicants will make an election without traverse by way of telephone practice.

I hereby certify that this correspondence is being deposited with the U.S. Postal Service with sufficient postage as First Class Mail, in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on the date shown below.

Dated: February 5, 2004 Signature:  Print Name: Matthew B. Demier

Applicants submit that pre-examination search(es) of the prior art have been made, based on the Applicants' understanding of the art, and searches conducted by international patent offices since this application has been filed. Information Disclosure Statements setting forth the references discovered during such pre-examination searches have been filed.

The Remarks section of this Petition discusses the references deemed most closely related to the subject matter encompassed by the claims of the present application. This discussion points out with the particularity required by 37 CFR § 1.111 (b)-(c) how the claimed subject matter is patentable over the references.

The fee of \$130.00 under C.F.R. § 1.17(h) has been paid by way of a check submitted herewith. The undersigned hereby authorizes the Commissioner to charge any additional fees that are due and owing by reason of this submission to Deposit Account No. 11-0223.

In view of the above allegations and the discussion below, Applicants respectfully submit that this Petition should be granted and that the instant application should be made special.

### **REMARKS**

The undersigned has reviewed the instant patent application, including the claimed subject matter. The undersigned has also reviewed the results of the pre-examination searches set forth in the above-mentioned Information Disclosure Statements. An analysis below of what is believed to be the most pertinent references shows that none of the references, taken alone or in combination, discloses or suggests the features of the invention as recited in independent claims 1, 38, 55, 66, 95, 111 or 121-124 (or the claims dependent thereon) of the instant application.

### **U.S. Patent No. 6,111,960**

U.S. Patent No. 6,111,960 ("the '960 patent") is directed to a system for processing an audio signal, in which a frequency band is selected, harmonics are

generated from the selected signal by a harmonics generator, and the harmonics are scaled by a level detector. The harmonics generator produces arbitrary harmonics of the audio input signal.

FIG. 5 and the description thereof at Col. 6, line 54 through Col. 7, line 24 of the '960 patent illustrate a circuit including a selecting means 20, a harmonics generator 22, a detecting means 28, an adding means 26, and a harmonics generator 22. The harmonics generator 22 includes a zero-crossing detector 240 for detecting zero crossings in a signal supplied by the selecting means 20, and a waveform generator 241 for generating a waveform based on the detected zero crossings. The produced waveform has an amplitude proportional to the detected level supplied by the detecting means 28. The waveform generator produces such waveforms as squarewaves, triangle waves, and sawtooth waves (see FIGS. 8a-8h).

The '960 patent teaches that by generating a waveform in response to the detected zero crossings, it is possible to generate harmonics having a predetermined and constant amplitude relation with each other. The '960 patent also teaches that by selecting the appropriate waveform, it is possible to select which harmonics are generated and which are not (e.g., a square waveform only comprises odd harmonics of a predetermined magnitude, a triangular waveform also comprises odd harmonics but with different magnitudes, and a sawtooth waveform comprises both odd and even harmonics).

The '960 patent discloses that the detecting means 28 is a level detector for detecting a level of at least a part of the spectrum of the audio signal, where the detected level is an amplitude level, a power level, a peak level, or an average level. (Col. 5, lines 28-34.)

Applicants submit that the '960 patent fails to disclose or suggest the features recited in independent claims 1, 38, 66, 95, or 121-124 of the instant application.

Independent claims 1, 66, 121, and 123 each require steps or apparatus for achieving the following actions:

- (i) producing a square wave signal from another signal containing frequencies from among a given range of frequencies such that the square wave signal contains square wave signal components at fundamental frequencies from among

another range of frequencies about one octave below the given range of frequencies;

(ii) producing an intermediate signal that contains sinusoidal signal components based on the square wave signal; and

(iii) amplifying the intermediate signal by an amount proportional to an instantaneous amplitude of the other signal to produce the sub-harmonic signal.

Applicants submit, however, that the '960 patent fails to disclose or suggest the above features of the subject claims. Indeed, although the harmonics generator 22 of the '960 patent includes a zero-crossing detector 240 and a waveform generator 241 for generating a waveform based on the detected zero crossings, the zero-crossing detector 240 does not appear to produce a square wave signal containing "square wave signal components at fundamental frequencies from among another range of frequencies about one octave below the given range of frequencies..." as claimed. Further, the waveform generator 241 does not appear to produce an "intermediate signal that contains sinusoidal signal components based on the square wave signal" as claimed. Rather, the '960 patent discloses that the waveform generator 241 produces squarewaves, triangle waves, and sawtooth waves.

Although the '960 patent discloses that the detecting means 28 is a level detector, where the detected level is an amplitude level, a power level, a peak level, or an average level, it does not disclose or suggest "amplifying the intermediate signal by an amount proportional to an instantaneous amplitude of the other signal to produce the sub-harmonic signal" as claimed.

Even though there are other documents disclosing sub-harmonic generation, e.g., M51134P Sub-Harmonizer For Bass Emphasis, Mitsubishi Sound Processor ICs, pp. 4-182 and 4-184 (which may or may not be prior art to the instant application), the teachings of that document do not remedy the deficiencies in the '960 patent.

Independent claims 38, 95, 122, and 124 of the instant application each require steps or apparatus for achieving the following actions:

- (i) producing a sub-harmonic signal from a given signal containing frequencies from among a given range such that it contains frequencies from among a another range of frequencies about one octave below the given range of frequencies;
- (ii) producing an intermediate signal that contains frequencies from among yet another range of frequencies including at least some frequencies above the other range of frequencies; and
- (iii) summing the sub-harmonic signal and the intermediate signal to produce at least a portion of an output signal.

The undersigned has reviewed the '960 patent in great detail and cannot find any disclosure of the above elements alone or in combination. Further, neither the M51134P document, nor any of the other documents, appear to remedy the deficiencies of the '960 patent in this regard.

#### **U.S. Patent No. 4,182,930**

As shown in FIG. 1 and described at col. 2, line 26 through col. 3, line 24 of U.S. Patent No. 4,182,930 ("the '930 patent"), the '930 patent is directed to an audio signal processing system including a signal sensing means 12 for sensing signal energy within a selected frequency range (e.g., 40-100 Hz) of the audio signal and for dividing the sensed signal energy into a plurality (i.e.,  $n$ ) of discrete frequency bands. For example, when the portion of the audio signal of interest is between 40 and 100 Hz, the sensing means 12 divides the portion sensed into six bands.

Each output is connected to signal generating means 14, which generates a signal which includes frequency components that are sub-harmonics of the frequencies of the corresponding frequency band provided at its input. The outputs of all the generating means 14 are summed through the summing means 16 for combining the signals.

The output of means 16 is connected to amplifying means 24 for amplifying the combined signal output of summing means 16. Amplifying means 24 is of a type which amplifies the combined signal output of summing means 16 by the RMS value of the sensed audio signal. When the level of the control signal is sufficient, as determined by

amplifying means 24, the output of summing means 16 is amplified in accordance with the value of the control signal.

Applicants submit that the '930 patent fails to disclose or suggest the features recited in independent claims 1, 38, 66, 95, or 121-124 of the instant application.

Independent claims 1, 66, 121, and 123 each require steps or apparatus for achieving the following actions:

- (i) producing a square wave signal from another signal containing frequencies from among a given range of frequencies such that the square wave signal contains square wave signal components at fundamental frequencies from among another range of frequencies about one octave below the given range of frequencies;
- (ii) producing an intermediate signal that contains sinusoidal signal components based on the square wave signal; and
- (iii) amplifying the intermediate signal by an amount proportional to an instantaneous amplitude of the other signal to produce the sub-harmonic signal.

Applicants submit, however, that the '930 patent fails to disclose or suggest the above features of the subject claims. Indeed, the undersigned cannot find any teaching in the '930 patent disclosing or suggesting "producing a square wave signal ... [containing] square wave signal components at fundamental frequencies from among another range of frequencies about one octave below the given range of frequencies" as claimed. Not surprisingly, therefore, the undersigned cannot find any teaching in the '930 patent disclosing or suggesting "producing an intermediate signal that contains sinusoidal signal components based on the square wave signal" as claimed.

Still further, although the '930 patent teaches that "the amplifying means 24 is of a type which amplifies the combined signal output of summing means 16 by the RMS value of the sensed audio signal," such amplification is not "by an amount proportional to an instantaneous amplitude of the other signal to produce the sub-harmonic signal" as claimed. Indeed, this lack of disclosure by the '930 patent is clearly evidenced by the statement therein that when "the level of the control signal is sufficient, as determined by amplifying means 24, the output of summing means 16 is amplified in accordance with the value of the control signal." Indeed that statement is antithetical to the claimed

amplifying feature: "by an amount proportional to an instantaneous amplitude of the other signal to produce the sub-harmonic signal."

Independent claims 38, 95, 122, and 124 of the instant application each require steps or apparatus for achieving the following actions:

- (i) producing a sub-harmonic signal from a given signal containing frequencies from among a given range such that it contains frequencies from among a another range of frequencies about one octave below the given range of frequencies;
- (ii) producing an intermediate signal that contains frequencies from among yet another range of frequencies including at least some frequencies above the other range of frequencies; and
- (iii) summing the sub-harmonic signal and the intermediate signal to produce at least a portion of an output signal.

The undersigned has reviewed the '930 patent in great detail and cannot find any disclosure of the above elements in combination.

#### **U.S. Patent No. 5,440,638**

U.S. Patent No. 5,440,638 ("the '638 patent") is directed to a system for field widening or enhancement of a stereo signal. As illustrated in FIG. 3 and discussed at columns 3 and 4 of the specification, the '638 patent, the stereo left channel signal fed at in input terminal 10 is passed through an inverter 14 and fed to a controllable attenuator 16. The output of attenuator 16 is fed to one input of a signal summing circuit 18. The other input to signal summing circuit 18 is the right channel signal fed in at terminal 12. As the left channel is inverted and fed to the summing circuit 18, the output of summing circuit 18 is effectively the difference between the right and left channels. This signal is fed through a controllable attenuator 20 whose output is then fed to the right placement filter 22. Similarly, the right channel signal fed in at terminal 12 is passed through an inverter 24 to a controllable attenuator 26. The output of the attenuator comprises one input to a signal summing circuit 28 with the other input consisting of the left channel signal fed in at input 10. The output then of the signal summing circuit 28 represents the left channel signal with the right channel subtracted therefrom. That difference signal is

fed through a controllable attenuator 30 whose output then is the input to the left-placement filter 32.

The left-channel signal fed in at terminal 10 can be level adjusted in controllable attenuator 34 and the output fed to one input of a signal summing circuit 36. The other input of signal summer 36 is the output of the right placement filter 22, so that the output of summer 36 becomes the stereo enhanced left channel output signal available at terminal 38. Similarly, the right channel signal fed in at input 12 is passed through a controllable attenuator 40 whose output becomes one input to a signal summing circuit 42. The other input to the signal summer 42 is the output of the left-placement filter 32. The output of the signal summer 42 is available at terminal 44 and represents the stereo enhanced right channel signal.

The system described in the '638 patent also includes controllable left and right placement filters 64 and 68 with a controllable the transfer function. The control may be user selectable to optimize the stereo enhancer for different speaker geometries or to adjust the center of the image focusing to the optimum listening position. The placement filtering operation provides a phase and amplitude differential between the signal paths of a channel.

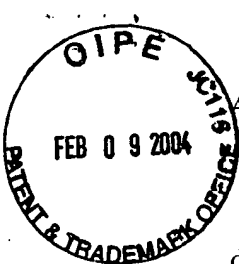
Among the documents uncovered during the pre-examination search(es), it is believed that the '638 patent is most relevant to claims 55 and 111 (and their dependent claims) of the instant application. Applicants submit, however, that the '638 patent fails to disclose or suggest the above-referenced features recited in independent claims 55 and 111 of the instant application

Independent claims 55 and 111 each require steps or apparatus for achieving the following actions:

canceling energy at at least some frequencies from among a first range of frequencies from the left channel signal to produce at least a portion of a left channel output signal, the at least some frequencies from among the first range of frequencies being derived from the right channel signal; and

canceling energy at at least some frequencies from among a second range of frequencies from the right channel signal to produce at least a portion of a right channel output signal, the at least some frequencies from among the second range of frequencies being derived from the left channel signal.





Application No.: 09/727,905

The undersigned has reviewed the '638 patent in great detail and cannot find any disclosure of the above listed elements of claims 55 and 111 alone or in combination. Indeed, although FIG. 3 of the '638 patent discloses inverting all of the right channel signal for mixing with the left channel signal, there is no disclosure in the '638 patent of "canceling energy at at least some frequencies from among a first range of frequencies from the left channel signal" based on such inverted right channel signal. Similarly, although FIG. 3 of the '638 patent discloses inverting all of the left channel signal for mixing with the right channel signal, there is no disclosure in the '638 patent of "canceling energy at at least some frequencies from among a second range of frequencies from the right channel signal" based on such inverted left channel signal.

### CONCLUSION

In view of the foregoing, it is apparent that none of the references disclose or suggest the features of the invention as recited in independent claims 1, 38, 55, 66, 95, 111 or 121-124 (or the claims dependent thereon) of the instant application. Further, it is apparent that no colorable argument may be made that relevant teachings from among the references of record may be combined to render the instant claims unpatentable.

In view of the foregoing, Applicants respectfully submit that this Petition should be granted and that the instant application should be made special.

Dated: February 5, 2004

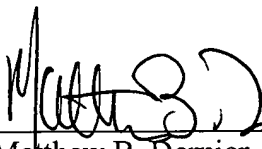
Respectfully submitted,

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